Air Quality Monitoring

Drayton Valley

Alberta Environment

July to September 2001 — Final Report

Summary

Alberta Environment monitored air quality in Drayton Valley in July, August and September of 2001 in response to local concerns regarding particulate matter from the Weyerhaeuser Oriented Strand Board (OSB) plant. Fine particulate matter ($PM_{2.5}$) was monitored because of the human health concerns in the community associated with the particulate matter emissions. The objective of the survey was to determine fine particulate levels in Drayton Valley and compare these levels to other locations in Alberta and to the Canada-wide Standard (CWS) 24-hour benchmark concentration for $PM_{2.5}$.

Alberta Environment set up $PM_{2.5}$ monitors at two locations in Drayton Valley (see map on page 3):

(1) Weyerhaeuser Trailer – located at 54 Street and 49 Avenue about one km north-northeast of the OSB plant.
(2) Residential Site – located at 37 Street and 49 Avenue about 2.5 km northeast of the OSB plant.

$PM_{2.5}$ samples were collected at these two locations as a 24-hour concentration, every sixth day conforming to the National Air Pollution Surveillance (NAPS) network schedule. Due to technical difficulties, the first two sampling days were taken one day after the NAPS scheduled day (e.g. samples were collected on July 13 and 19 instead of July 12 and 18 as per the NAPS schedule). A total of 13 $PM_{2.5}$ samples were collected at each location from July 13 to September 22, 2001.

Additional air quality data collected at the Weyerhaeuser Trailer is also summarized in this report. This includes inhalable particulate (PM_{10}) data that is continuously monitored and formaldehyde data that is sampled as a 24-hour concentration, every sixth day, according to the NAPS schedule.

PM_{10} are particles less than 10 micrometres in diameter that can be inhaled into the nose and throat. A human hair is about 70 micrometres in diameter. $PM_{2.5}$ are particles less than 2.5 micrometres in diameter, also called fine particulate matter; they are important from a human health perspective as they can penetrate deep into the lungs. Ambient particulate matter originates from natural sources such as soil, dust, fires, and plant pollens, as well as from anthropogenic (human) sources including agricultural practices, forestry, combustion processes, transportation and industry emissions.

ISBN No 0-7785-3052-3 (Printed Edition)
ISBN No. 0-7785-3053-1 (On-Line Edition)
Pub No. T/723 (Printed, On-Line Edition)
October 24, 2003

Results

- The Canada-wide Standards (CWS)[1] benchmark concentration for $PM_{2.5}$ was not exceeded in any samples collected in Drayton Valley. The maximum 24-hour $PM_{2.5}$ concentration measured at both Drayton Valley sites was 26.1 $\mu g/m^3$ (micrograms of particulate per cubic metre of air) compared to the 24-hour CWS benchmark concentration of 30 $\mu g/m^3$. This value was measured in samples collected on August 11. The next highest $PM_{2.5}$ concentrations were measured on August 17 with 24-hour values of 18.5 and 17.3 $\mu g/m^3$ recorded for the Residential Site and Weyerhaeuser Trailer, respectively. Elevated $PM_{2.5}$ levels on August 11 and 17 were primarily due to smoke from forest fires in southern British Columbia. $PM_{2.5}$ levels at other monitoring stations in Alberta were also elevated in August. $PM_{2.5}$ data collected at the two Drayton Valley monitoring sites and at other locations in Alberta is presented in Tables 1 and 2 and Figure 2 (see pages 4 and 5).

- $PM_{2.5}$ levels were very similar at both Drayton Valley monitoring locations. The median $PM_{2.5}$ concentration at the Weyerhaeuser Trailer was 5.9 $\mu g/m^3$ and the median value at the Residential Site was 5.5 $\mu g/m^3$. These values are lower than median $PM_{2.5}$ concentrations measured for the same 13 days at the Edmonton Northwest (9.6 $\mu g/m^3$), Calgary Central (8.3 $\mu g/m^3$) and Red Deer (8.1 $\mu g/m^3$) stations. Median $PM_{2.5}$ concentrations at the rural Tomahawk (25 km northeast of Drayton Valley) and Hightower Ridge (65 km northwest of Hinton) monitoring sites for these 13 days were 3.5 and 1.7 $\mu g/m^3$, respectively.

- Formaldehyde concentrations were well below Ontario's 24-hour Ambient Air Quality Criteria (AAQC)[2] in July, August and September 2001 at the Weyerhaeuser Trailer. The maximum 24-hour formaldehyde concentration measured in Drayton Valley (8.0 ppb) is substantially lower than the Ontario AAQC of 53 ppb (parts per billion). Formaldehyde data is presented in Table 1 and Figure 3 (see pages 4 and 5).

- The median 24-hour PM_{10} concentration measured at the Weyerhaeuser Trailer in Drayton Valley from July to September 2001 was 16.9 $\mu g/m^3$. This value is lower than median PM_{10} levels recorded over the same three months at the Edmonton Northwest (18.7 $\mu g/m^3$) and Calgary Central (23.4 $\mu g/m^3$) stations. Median PM_{10} concentrations at the Tomahawk and Hightower Ridge stations from July to September were 11.5 and 5.2 $\mu g/m^3$, respectively. However, the maximum 24-hour PM_{10} concentration at the Weyerhaeuser Trailer (70.0 $\mu g/m^3$) was higher than those measured at the Edmonton Northwest (64.1 $\mu g/m^3$) and Calgary Central (51.9 $\mu g/m^3$) stations for the same three months. PM_{10} levels in Drayton Valley are likely influenced by a number of sources including natural wind-blown dust, heavy diesel truck traffic and local industries. PM_{10} data from Drayton Valley and other locations in Alberta are presented in Table 3 and Figure 4 (see page 6).

---

[1] *Canada-wide Standards for Particulate Matter (PM) and Ozone.* Canadian Council of Ministers of the Environment. Endorsed by CCME Council of Ministers, June 5-6, 2000, Quebec City.

[2] *Summary of Point of Impingement Standards, Point of Impingement Guidelines and Ambient Air Quality Criteria (AATCs).* Standards Development Branch, Ontario Ministry of the Environment. September 2001.

Figure 1 Particulate monitoring sites in Drayton Valley.

Table 1 24-hour particulate ($PM_{2.5}$ and PM_{10}) and formaldehyde concentrations, and weather conditions in Drayton Valley (July 13 to September 22, 2001).

Monitoring Date	Residential Site	Weyerhaeuser Trailer					
	$PM_{2.5}$ [a] ($\mu g/m^3$)	$PM_{2.5}$ [a] ($\mu g/m^3$)	PM_{10} [b] ($\mu g/m^3$)	Formaldehyde (ppb)	Wind Speed (km/h)	Predominant Wind Direction	Temperature (°C)
13-Jul-01	10.7	10.3	34.1	<0.1 [c]	8.2	SSW to ESE	18.9
19-Jul-01	2.7	3.2	18.8	<0.1 [d]	11.8	W to NW	14.9
24-Jul-01	5.9	3.8	3.8	0.1	15.3	W to NNW	11.9
30-Jul-01	1.6	2.6	14.2	<0.1	11.5	SW to WNW	15.4
5-Aug-01	5.5	6.1	12.9	2.9	5.9	NNE and S to SW	15.8
11-Aug-01	26.1	26.1	50.7	6.2	5.8	S and N to ESE	19.3
17-Aug-01	18.5	17.4	51.9	3.6	6.6	SSW to ENE	20.1
23-Aug-01	9.2	8.6	33.7	8.0	8.4	NW to N and SW to S	15.0
29-Aug-01	9	8.1	28.8	3.5	4.1	S to SSE and E to ENE	13.7
4-Sep-01	3.7	4.2	23.7	2.3	4.5	E to NE and SW to SSE	9.4
10-Sep-01	0.9	2	10.1	1.7	8.5	W to NW	7.3
16-Sep-01	5.4	5.7	19.2	2.7 [e]	6.7	NW to ENE	12.9
22-Sep-01	5.5	5.9	15.4	2.8 [f]	5.8	S to E	11.5
Median	5.5	5.9	19.2	2.7	6.7	n/a	14.9
Maximum	26.1	26.1	51.9	8.0	15.3	n/a	20.1
Standard or Guideline	30 [g]	30 [g]	n/a	53 [h]	n/a	n/a	n/a

a $PM_{2.5}$ data collected using a Partisol sampler provided by Alberta Environment.

b PM_{10} data collected using the Weyerhaeuser continuous TEOM sampler.

c Sample collected on July 12/01.

d Sample collected on July 18/01.

e Sample collected on September 17/01.

f Sample collected on September 24/01.

g The Canada-wide Standard benchmark concentration for $PM_{2.5}$ for a 24-hour time period is 30 $\mu g/m^3$.

h The Ambient Air Quality Criteria in Ontario for formaldehyde for a 24-hour time period is 65 $\mu g/m^3$ (53 ppb).

Table 2 24-hour $PM_{2.5}$ concentrations in Drayton Valley and at other Alberta monitoring sites ($\mu g/m^3$).

Sampling Date	Drayton Valley		Edmonton Northwest	Calgary Central	Red Deer	Tomahawk	Hightower Ridge
	Residential Site	Weyerhaeuser Trailer					
13-Jul-01	10.7	10.3	9.6	9.4	9.4	6.2	4.5
19-Jul-01	2.7	3.2	8.5	5.6	5.6	1.5	2.2
24-Jul-01	5.9	3.8	8.9	6.7	6.6	2.5	1.0
30-Jul-01	1.6	2.6	8.1	5.3	5.3	1.2	2.6
5-Aug-01	5.5	6.1	8.6	5.3	6.0	3.1	1.4
11-Aug-01	26.1	26.1	26.7	20.1	25.1	17.0	14.4
17-Aug-01	18.5	17.4	17.5	19.9	16.4	12.7	11.3
23-Aug-01	9.2	8.6	16.7	5.6	10.1	6.8	0.4
29-Aug-01	9.0	8.1	12.5	10.6	8.4	5.6	1.7
4-Sep-01	3.7	4.2	9.6	8.3	7.5	1.2	1.0
10-Sep-01	0.9	2.0	6.7	6.9	5.6	0.7	0.6
16-Sep-01	5.4	5.7	7.9	11.5	9.4	3.5	4.0
22-Sep-01	5.5	5.9	9.6	8.5	8.1	4.8	0.9
Median	5.5	5.9	9.6	8.3	8.1	3.5	1.7
Maximum	26.1	26.1	26.7	20.1	25.1	17.0	14.4
Canada-wide Standard [a]	30	30	30	30	30	30	30

a The Canada-wide Standard benchmark concentration for $PM_{2.5}$ for a 24-hour time period is 30 $\mu g/m^3$.

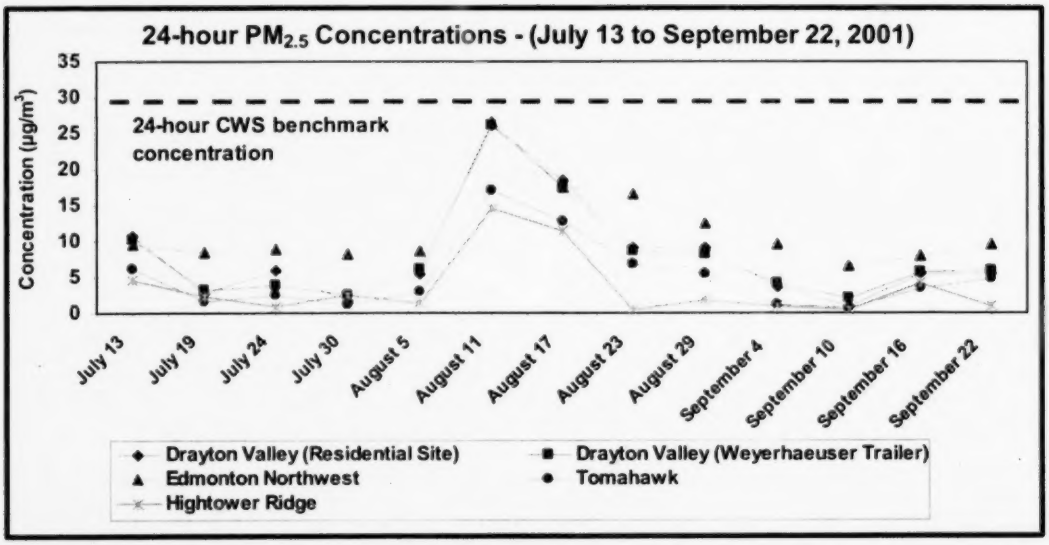

Figure 2 24-hour fine particulate ($PM_{2.5}$) concentrations at Drayton Valley and other Alberta monitoring sites.

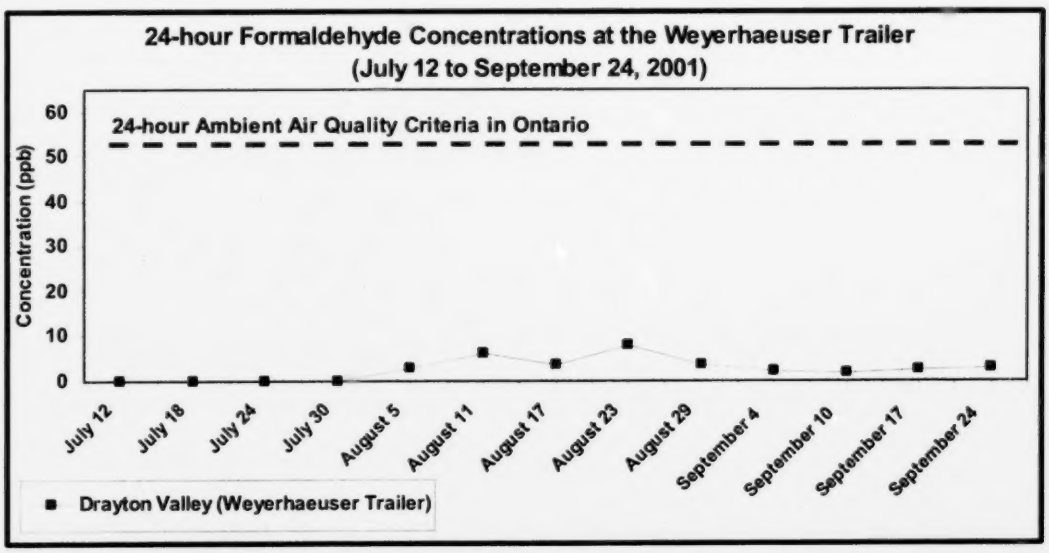

Figure 3 24-hour formaldehyde concentrations at the Weyerhaeuser Trailer.

Table 3 24-hour PM_{10} concentrations in Drayton Valley and at other Alberta monitoring sites ($\mu g/m^3$).

Month(s)		Drayton Valley Weyerhaeuser Trailer	Edmonton Northwest	Calgary Central	Tomahawk	Hightower Ridge
July	Median	13.1	16.8	19.2	8.9	5.5
	Maximum	34.1	34.1	42.7	26.0	10.3
August	Median	33.7	30.5	31.5	23.0	5.2
	Maximum	66.2	61.3	51.9	56.9	18.4
September	Median	20.7	19.6	24.4	12.9	4.6
	Maximum	70.0	64.1	49.0	30.7	10.4
July to September	Median	16.9	18.7	23.4	11.5	5.2
	Maximum	70.0	64.1	51.9	56.9	18.4

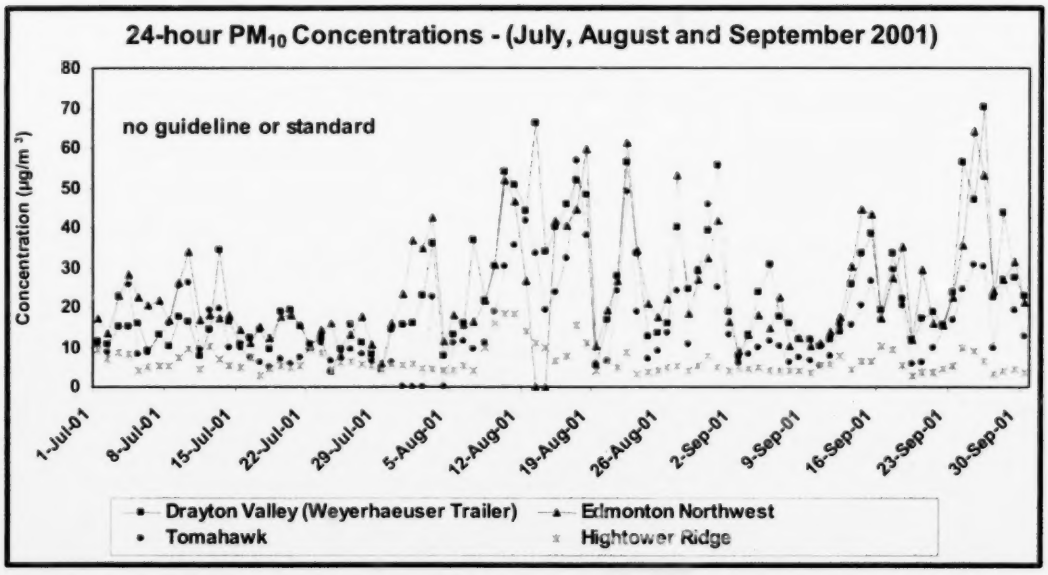

Figure 4 24-hour Inhalable PM_{10} concentrations at Drayton Valley and other Alberta monitoring sites.